

Sentinel 2 in Europe's Earth observation programme (GMES)

Alan Belward
Joint Research Centre
Ispra (VA) Italy

alan.belward@jrc.ec.europa.eu



Simulated TCC Sentinel-2 10m res, courtesy ESA

Funding framework agreed

- Europe's Earth Observation Programme (GMES)* was adopted 9th November 2010
 - A joint initiative of the European Union and the European Space Agency
- This includes both spacecraft (Sentinels) and services (the GMES Initial Operations)
- A land service is part of the initial operations
- GMES is the main space contribution of the European Union to tackle climate change**

*COM(2009) 223; **The European Earth Observation Programme (GMES) and its Initial Operations**

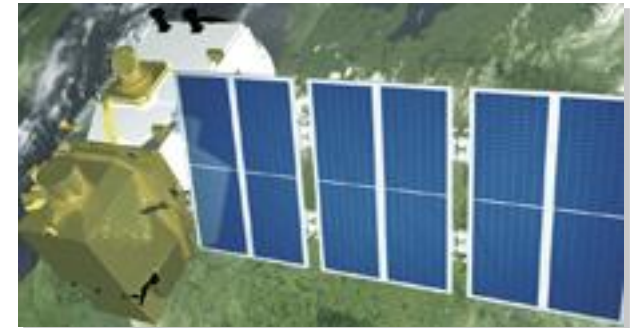
COM(2010) 614; **An Integrated Industrial Policy for the Globalisation Era

An operational EO Programme

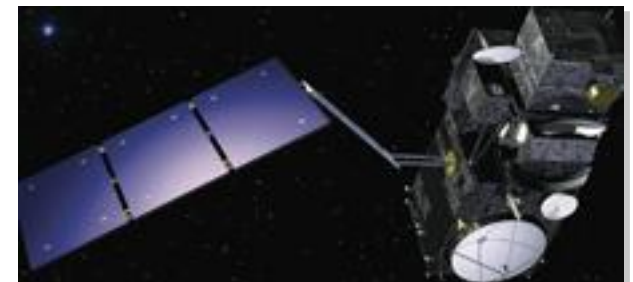
- Overall framework
 - space component (ESA coordination)
 - in-situ component (EEA coordination)
 - service component (EC coordination)
 - land, marine, atmosphere, emergency response, climate change, security
- Funding leading up to the regulation **€2.9bn**
 - 2003 – 2006 the EU and ESA spent €100m each on GMES projects
 - 2007 – 2013 the EU budgeted €430m for GMES project work
 - 2007 – 2013 the EU contributed €624m to the total ESA GMES space component budget of €2246m
- Funding for **GMES Initial Operations (GIO) €150m**
 - 2011 – 2013 the EU has allocated €107m to the implementation of the Regulation
 - 2011 – 2013 the EU has redeployed an additional €43m from the research budget



Sentinel 1 (C-band SAR)
a and b

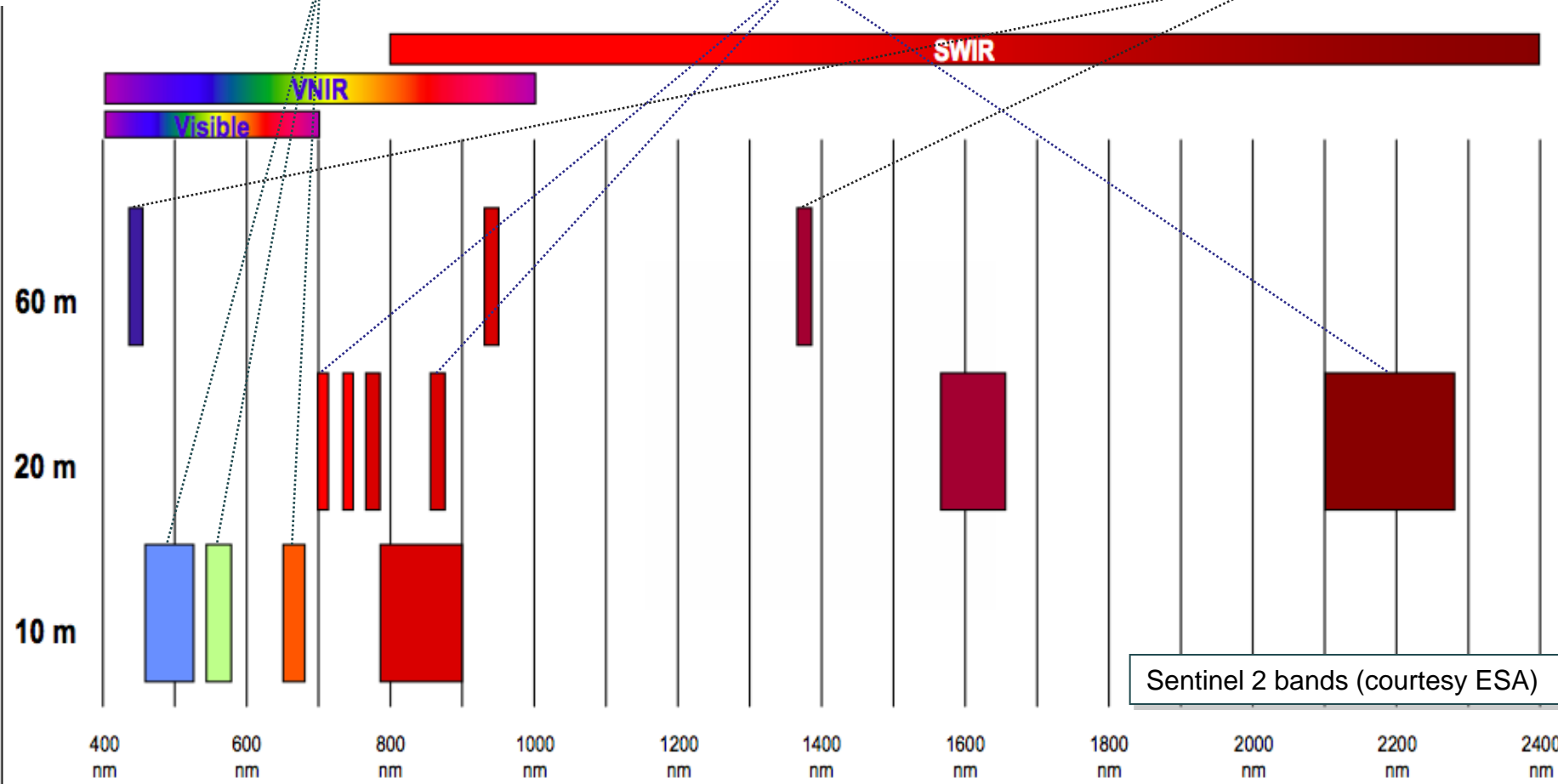
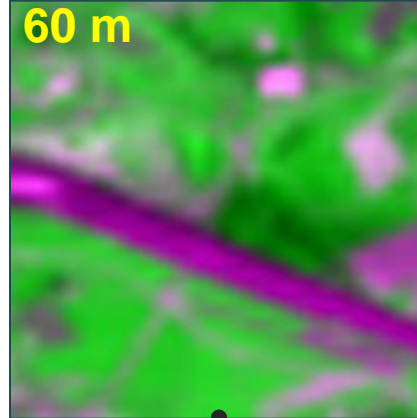
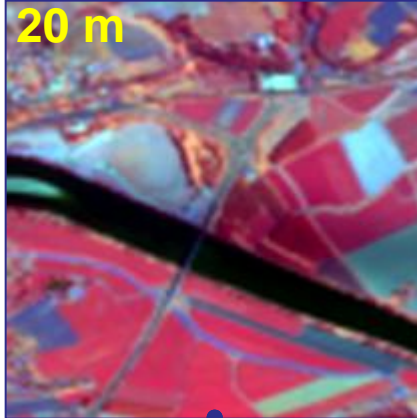


Sentinel 2 (13 channel MSI)
a and b



Sentinel 3 (21 channel OLCI)
a and b

Sentinel 2
simulations
(Courtesy ESA)



Sentinel 2 bands (courtesy ESA)

S2 product line

- **290 km swath, 5 day revisit when both satellites are in operation**
- **L1c standard product; orthorectified ToA reflectance (+ parameters for reflectance to radiance conversion) 100 by 100 km tiles**
- **2.4 TB on board storage and 4 ground receiving stations = all land and coastal water areas should be acquired**
- **Free and open access data policy almost finalised**

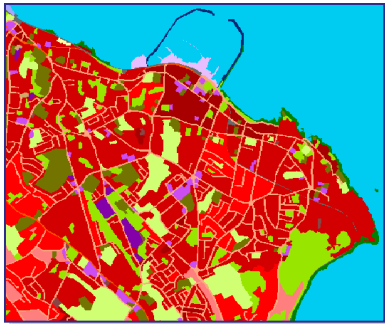
GMES 'Regulation' adopted 9th November 2010

- “The GMES services will allow policy-makers in particular to:
 - prepare national, European and international legislation on environmental matters, including climate change;
 - monitor implementation of this legislation;
- “GMES is a tool for cooperation linked to development, humanitarian aid and emergency situations worldwide and, more specifically, with Africa”

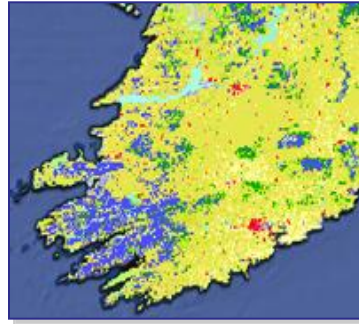


Land monitoring service

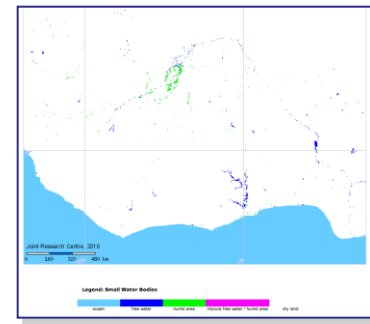
- **Reference data:** basic geographic framework
- **Local component:** 1 m resolution mapping of Urban Areas (2011-2012) and extension to other 'hot spots' e.g. Biodiversity protection sites
- **Pan-European component:** Land Use / Cover Area mapping at 10 m resolution
- **Global component:** the terrestrial essential climate variables, modelling and 'hot spots'



Urban atlas (Dublin)
<http://www.land.eu/portal/>



Corine
<http://www.land.eu/portal/>



small water bodies
<http://bioval.jrc.ec.europa.eu/EMMA/emma/index.php>

Mission Advisory Group met 22nd November 2010

- **Open questions:**
 - **atmospheric corrections schemes for use in S2 L2a product development**
 - **preferences for DEM – and GCPs**
 - **advice on priority ground test sites that S2 should use for vicarious calibration**
 - **desirability for integrating sphere intercomparison with transfer radiometers?**
 - **links with ‘Sentinel North’ (CCRS Richard Fernandes)?**